gas as in air. Grapes are capable of absorbing or losing water when kept in a moist medium or in a dry medium. As maturation advances, the acids diminish and the sugar increases. The mechanism of maturation is stated to be this:—Acids and glucose are formed in the plant, and the sap conducts them to the grape; the acids are consumed in it, while the sugar is concentrated. When the maturation is very advanced, the sugar is consumed in its turn.

RIPENING OF GRAPES AFTER REMOVAL FROM THE VINE.—In the *Gazetta chimica Italiana*, vii. 517, some experiments by M. Pollacci are described, in which he finds that the process of ripening continues for a certain time after the grape has been removed from the parent plant. The bunches of fruit removed were, as far as possible, equally divided, and the quantity of glucose and acid determined in the freshly-gathered grapes, as also in portions kept in the shade for some ten or twelve days. In all the portions which had been kept, the glucose had increased, whilst the amount of acid had diminished, showing that a certain amount of ripening action had taken place; this action, however, ceases after a time, the ripening never attaining full maturity.

USE OF METHYL CHLORIDE FOR THE PRODUCTION OF LOW TEMPERATURES.—At a recent meeting of the French Physical Society, M. Vincent called attention to the use of chloride of methyl for production of low temperatures. It may be extracted in large quantities and cheaply from the products of beet-root molasses. It is normally gaseous, and liquefies under about four atmospheres pressure, when it may be conveniently carried about in iron or copper vessels, a store of cold at easy disposal. On opening a cock the liquid will flow out and give a bath at − 23°, its boiling temperature under atmospheric pressure. If the vaporisation be intensified by a current of air, the temperature descends to about − 55°. M. Vincent has arranged an apparatus for utilisation of such cold. He incloses two or three kilogrammes of liquid chloride of methyl in a double wall enveloping a bath of alcohol or chloride of calcium in solution, and protected exteriorly by an isolating layer of cork raspings. To obtain low temperatures, a cock is opened to allow communication of the double envelope (through a caoutchouc tube) with an air-pump.

FORMATION OF HYDROCARBONS BY THE ACTION OF WATER ON MANGANESE IRON ALLOYS CONTAINING CARBON.—Cloëz found that by acting on Spiegeleisen with dilute sulphuric acid bodies resembling the petroleum hydrocarbons were formed. On trying the action of pure water at 100° no results were obtained, while at 250° with super-heated steam, a certain action was perceived which increased with the temperature, being completed at a dark red. The hydrocarbons, however, were again decomposed. The same author has since tested a series of manganese alloys, and finds that the best results are obtained by means of one containing roughly Mn 85, Fe 6, C 3·5, Graphite 4, Si 1·1. Small portions of this, treated with boiling water, decomposed the latter with the evolution of hydrogen, oily drops being simultaneously formed, and the gas burning with a luminous flame showed the presence of hydrocarbons. Another alloy of nearly similar composition gave the following results: the flask contained slightly alkaline water with a mixture of iron and manganese oxides in suspension; the liquid hydrocarbons in the condenser were similar to those previously found, the gases also burning with luminous flames. He has thus shown that water alone at the proper temperature decomposes manganese iron alloys containing carbon.

ACTION OF BORON FLUORIDE ON CERTAIN CLASSES OF ORGANIC COMPOUNDS.—This body has been found by Fr. Landolph to combine in definite proportions, equivalent for equivalent, with certain classes of organic bodies such as aldehydes, acetones, and also with camphor. For his experiments the particular substances examined were ethylic, valeric, and benzylic aldehydes, ordinary acetone, euodic aldehyde (oil of rue), and ordinary camphor. In all these cases considerable disengagement of heat was manifested in the combinations of the several substances. By the action of the fluoride on acetone two products are obtained, the one boiling between 130°-140°, this being, according to the author, the most definite; another compound, however, exists which boils at a temperature of 160°-170°. The first is a fluid of a syrupy consistence and yellow-green colour; it burns readily, giving a green flame, and is entirely decomposed by water. The compound, with ethylic aldehyde, ethylen fluoboride, $C_2H_3BFl_2$, undergoes decomposition when treated with water, into a body with a peculiar ethereal odour, the composition of which, the author thinks, may probably be C_2H_5Fl.

GEOGRAPHICAL NOTES

IN the just-published number of the Royal Geographical Society's *Proceedings* we find some useful remarks by Mr. F. Galton, on what has recently been done and what is further required for the advancement of geographical teaching. First and foremost, he says, is the publication of that excellent book by Prof. Huxley, "Physiography," which, starting from the simplest elements, led students steadily on to the higher conception of physical geography and the most recent discoveries in it. Next, Sir Walter Trevelyan, a former Secretary of the Society, had felt so much the necessity of a better form of text-book for geographical teaching that he had placed a handsome sum at the disposal of the Council to procure, if they were able to do so, the compilation of a really good county geography, to serve as an example for other similar works to be used in elementary schools. Turning to what is required in the future, Mr. Galton mentions that they have received a letter from a master of one of the great public schools, urging them to plan a system of diagrams explanatory of different physical features. His own opinion, Mr. Galton says, is that what is most urgently needed is some simple and well-methodised system of experiments, suited to illustrate lectures on the main features of physical geography. He has no doubt that an extension of the methods of illustrating the facts of physical geography—as used by Prof. Tyndall and Dr. Carpenter—on a small scale and on a lecture-room table, is perfectly feasible. Thus, as every thunder-shower shows in the streets the phenomena of erosion and deposition, he has no doubt that, on a lecture-table, with a can to supply water, and with a certain quantity of sand, gravel, and clay, all the main phenomena of river-action, such as the sifting of materials, the stratification of deposits, and the formation of deltas, might be successfully shown.

MEANS have recently been found, we learn from the *South Australian Register*, for still further increasing the usefulness of the Hon. (now Sir) T. Elder's camels on the far northern stations with which he is connected. The experiment of using them for draught purposes has been tried, and recently two teams of six camels drew loads of $5\frac{1}{4}$ tons each from Beltana to Port Augusta. The plan adopted is to yoke the animals together something after the manner in which bullocks are coupled, and one man only is required to manage each team. It has been found that the camels thrive well in the northern country; the number originally imported several years ago was about 100, of which the greater part died, as the land, by its comparative richness, presented too great a contrast to their native soil; there are now, however, about 400 of their descendants at Lake Hope, Umberatana, Beltana, and other stations in the far north, and the race seems to be thoroughly acclimatised. The camels have already been

found to be of great service in exploring expeditions, and they are still being used by parties engaged in opening up new pastoral country. Several of the animals have recently been lent to squatters for expeditions to the country on the Western Australian border, the MacDonnell ranges in Central Australia, and elsewhere.

FROM the new issue of Behm and Wagner's "Bevölkerung der Erde," we learn that the present population of the earth is estimated at 1,439 millions as compared with 1,424 millions given in the previous issue. This increase results mainly from the recent censuses which have been taken in several countries. This population is divided among the several continents as follows:—Europe, 312,398,480; Asia, 831,000,000; Africa, 205,219,500; Australia and Polynesia, 4,411,300; America, 86,116,000. This new issue contains the first map we have seen of New Zealand with the recent division into counties, in substitution for the old division into provinces. A census according to counties cannot, however, be taken till 1881. The North Island has thirty-three and the South Island thirty-one counties.

MR. STANFORD has issued a very useful shilling Treaty Map of South-Eastern Europe and Armenia, showing the boundaries of the New Bulgaria and Eastern Roumelia, the accessions to Austria, Russia, Montenegro, Servia, and Roumania, and all the other changes which have been made by the recent Congress. The new features are shown with unmistakable clearness. Mr. Stanford is also preparing a large scale map of Cyprus, showing not only the physical, but also the geological, agricultural, and other features of our latest acquisition.

AN expedition to the mouth of the Yenisei River left St. Petersburg last week. Principally at the instigation of a Moscow commercial firm eight steamers laden with corn, spirits, nitre, and other goods will soon start on the new sea-road to Siberia, their return cargoes consisting of wood and tea.

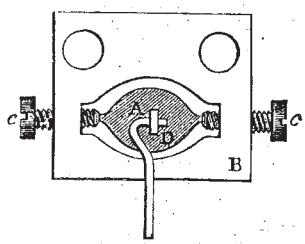
MR. GORDON BENNETT proposes to send the yacht *Dauntless* on a voyage of discovery to the Polar Seas, *viâ* Spitzbergen, in addition to the *Pandora*, which will attempt to reach the Pole by another route.

A METHOD OF RECORDING ARTICULATE VIBRATIONS BY MEANS OF PHOTOGRAPHY[1]

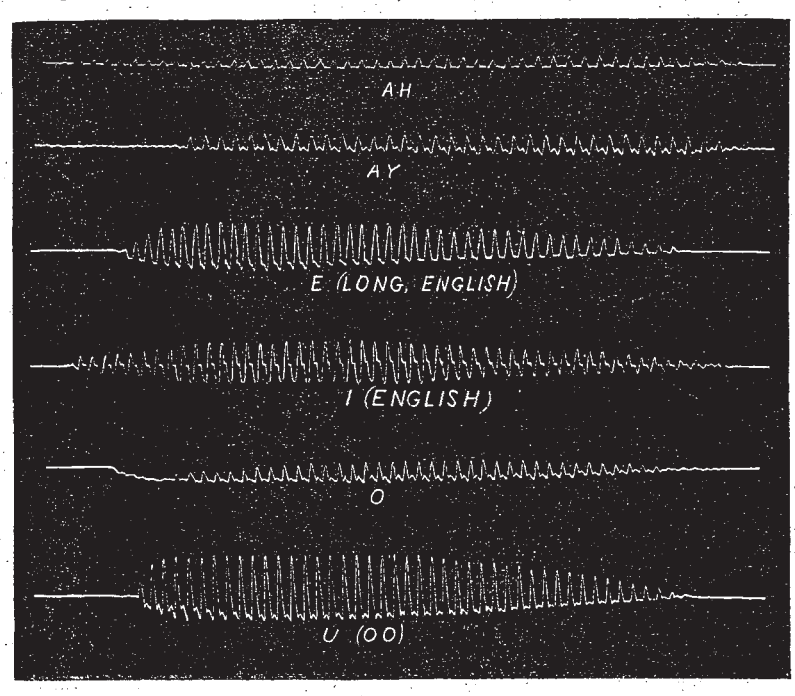
THE object of this paper is to describe a method of obtaining photographs of minute vibrations on a magnified scale.

A plane mirror of steel, A, is supported by its axis in the metal frame B. The ends of the axis are conical, and carefully fitted into sockets in the ends of the screws C, C. On the back of the mirror is a slight projection, D, pierced by a small hole.

The vibrating disc, as hitherto employed, is a circular plate of ferrotype iron, $2\frac{3}{4}$ inches in diameter, screwed to the back of a telephone mouthpiece of the form invented by Prof. John Peirce, and now universally used. From the centre of the back of this disc a stiff steel wire projects, the end of which is bent at a right angle. This wire serves to connect the vibrating disc with the mirror by hooking into the hole in D, as represented in the figure. The mirror frame and the vibrating disc are kept in a fixed relation to each other by a block of hard wood, to which both are firmly screwed. The mirror is set with its axis parallel, and its reflecting surface perpendicular, to the vibrating disc.



Back view of mirror, actual size.



A heliostat sends a beam of sunlight horizontally through a small circular opening. This beam passes into a dark closet, and at a distance of several feet from the circular opening falls upon the mirror above described, placed with its axis inclined 45° to the horizon. The rays, reflected vertically downward, pass through a lens at whose focus they form an intensely luminous image of the circular opening.

[1] The text abridged for NATURE by Prof. E. W. Blake, of Brown University, from a paper in the *American Journal* for July. The illustrations (except mirror) from photos supplied by Prof. Blake.